FOREST PRACTICES, SUSTAINABILITY, BIODIVERSITY AND THE LOW CARBON FUEL STANDARD

Drawing on 'POTENTIAL POSITIVE AND NEGATIVE ENVIRONMENTAL IMPACTS OF INCREASED WOODY BIOMASS USE FOR CALIFORNIA

by

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Download draft at http://forestry.berkeley.edu/

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Forestry, Biodiversity, and LCFS

- Why it matters – CHP, electricity, future liquid fuels – all can use forest biomass (sustainably?)
- Energy feedstocks will be sourced from inside and outside of California similar to the patterns for wood and energy
- Collecting energy feedstocks will affect forest structure, sequestration, and emissions
  - fire adapted forests
  - summer moist forests
  - riparian and wildlife niches

LCFS comes from plants like this
Collins Pine in Chester, CA has powered their sawmill and generated electricity from wood chips for 25 years

Biodiversity was a key piece of our completed CEC project

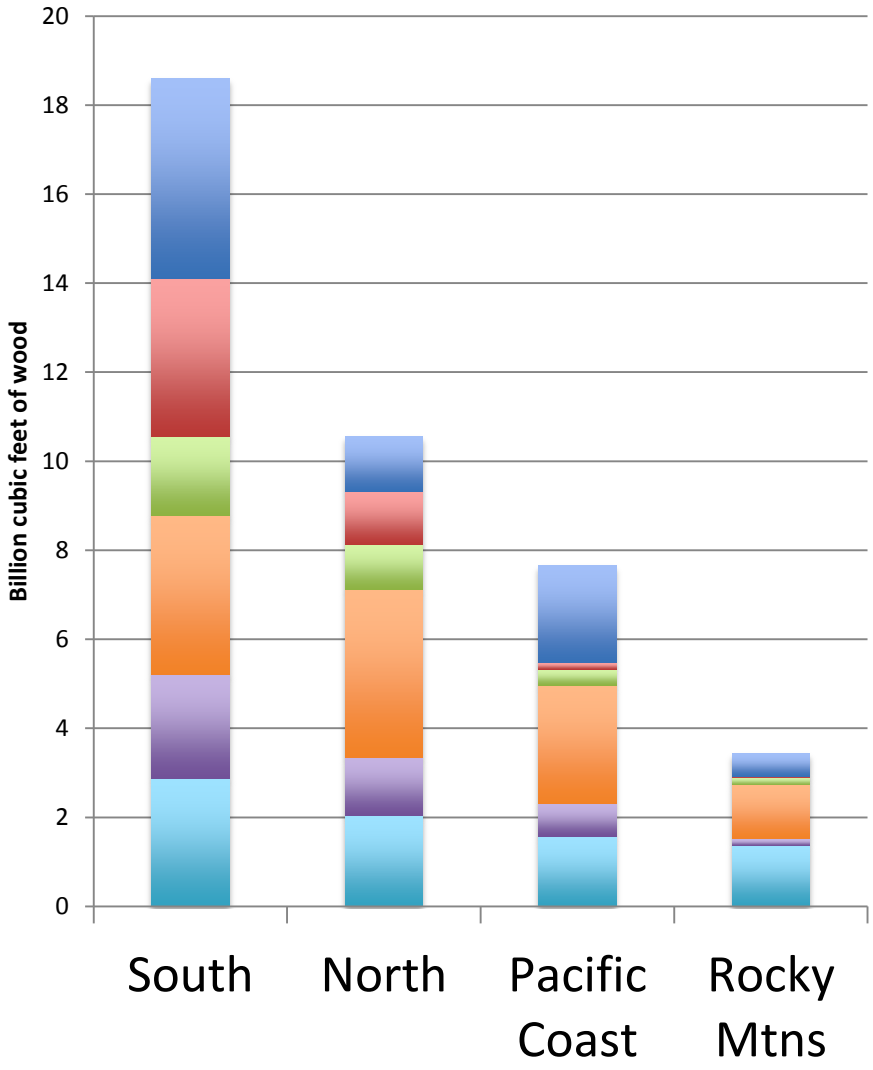
- Literature review of relevant published science
  - 1. Maintenance of soil and site productivity
  - 2. Protection of water quality and riparian zones
  - 3. Maintenance of long term productivity through appropriate silviculture
  - 4. Maintenance of dead wood and snags
  - 5. Maintenance of wildlife habitats and biodiversity

- Identify key information gaps
  - 1. Understanding of what forests could be managed how
  - 2. Lack of coordinated and long term field sites in CA

Key environmental metrics at the stand, watershed, state, global level

- Nutrient consequences of increased woody biomass removals
  - Less material for on-site decomposition
  - Less material that is potentially hazardous fuel
- Impacts of water quality
  - Across the watershed
  - In small streams
  - In larger streams and rivers
- Impacts on wildlife habitats
- Impacts to biodiversity
  - Change in dead wood, understory, downed wood
  - Changes between high and moderate amounts of live tree vegetation
- Impacts on disturbance probabilities and intensities

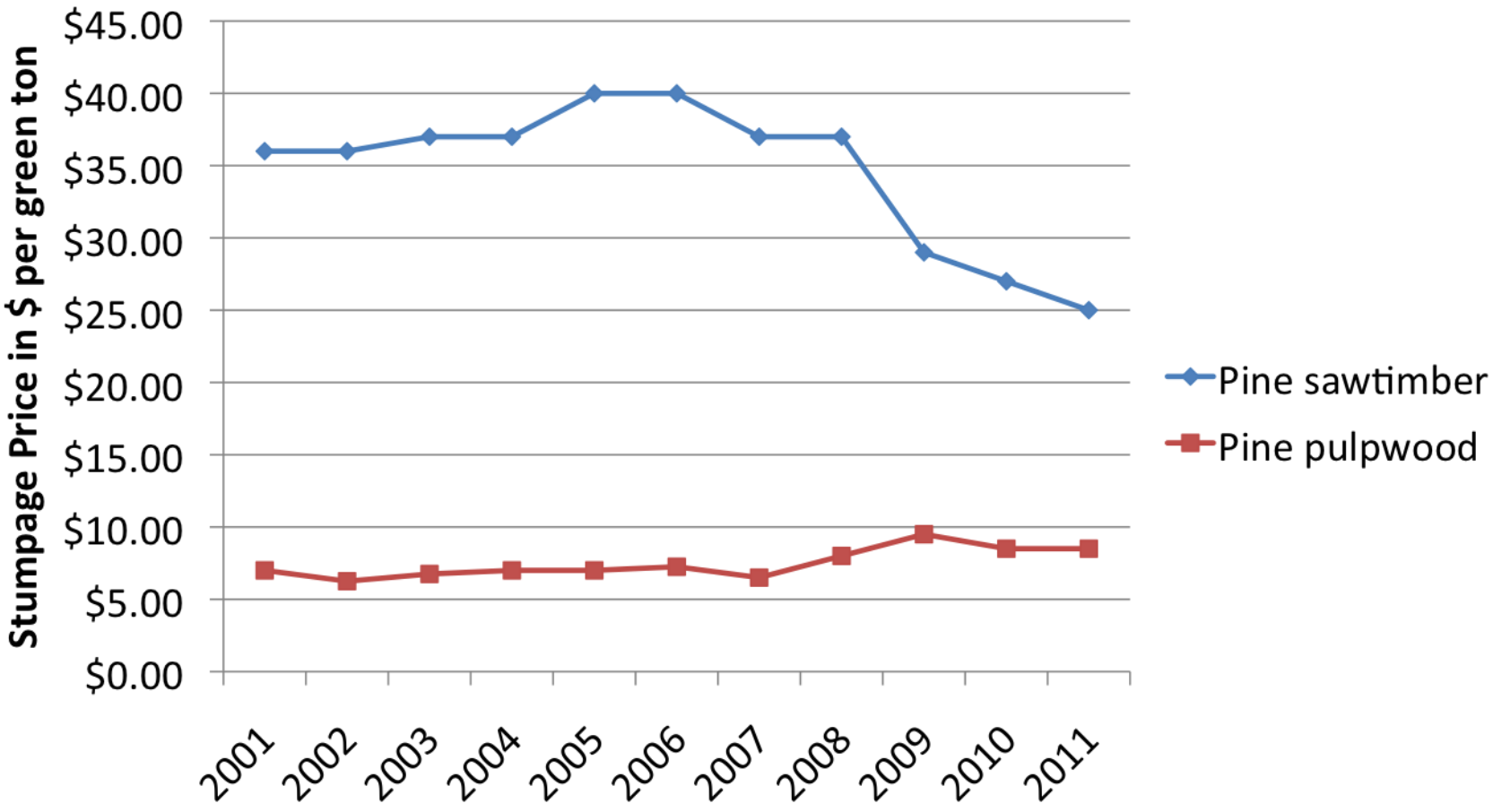
US Forests- 2006 Annual Carbon Flux



- Sawlogs — 83% to products, 16% to energy, 1.5% to waste
- Pulpwood — 50% to pulpmill energy, 50% to paper OR to pellets, panels, energy
- Fuelwood, etc. — Industrial, residential, commercial heat
- New Growing Inventory after removals — Net growth after removals and mortality
- Logging Residues — Left in forest –
  (+) wildlife habitat
  (-) excess fuel/fire risk
  (-) CO2 emission from microbial respiration
  (-) impede tree regeneration
  (0) direct plant nutrient
  (+) maintain humus
- New Mortality

Remember: The US imports around 30% of our wood and >50% of our energy

Will large trees be chipped for energy feedstocks? – NO, forest landowners will always sell trees for timber if they can, as it is worth 2x-6x as much



Source: Timber Mart South web site

Natural forests are required to provide more social and environmental benefits than agricultural or suburban lands

- Wildlife habitats
- Biodiversity
- Less erosion and water quality impacts
- Aesthetically pleasing vistas

- They are also more affected by natural disturbances – fires, insects, diseases

Sometimes they burn up and may or may not be harvested and replanted

A lot of California looks like this
This severe fire burned up many spotted owl sites
There is less green biomass and more black biomass
And fire weather could get a lot worse


Star Fire – Harvest/Regenerate vs. Lawsuit/Delay
Action and No Action create different habitats and different patterns of future fire risks

Land Cover Changes in Three Forested Regions in California in km^2 from 88,360 km^2 in 1973

Forest cover	- 2,844 km^2
Recent wildfires	+ 1,461 km^2
Grass/shrub cover	+ 1,325 km^2
Developed area	+ 108 km^2

Source: Sleeter (2010)

- Wildfire areas will regenerate but possibly to shrubs or grass unless an active reforestation program is implemented.
- Nearly all wildfire area in corporate forest land gets replanted but families and government agencies often have investment constraints or other goals
- Loss of forested area will also lead to decrease terrestrial carbon storage

No Cost to Landowner Fuel Hazard Reduction Treatment from selling bioenergy chips and a few sawlogs – Lassen County
Result: Less understory, less ladder fuels, greater fire resiliency

Biodiversity concepts that could be operationalized for managed forests

- Connectivity
- Stand structural complexity
- Landscape heterogeneity
- Range of natural variability
- Retention targets – number or ranges

However, simulations with the California Wildlife Habitat Relationship (CWHR) could not show project-level changes in estimated habitat quality from biomass harvests in mixed conifer, woodland, or mixed chaparral. Larger landscape analysis that are far bigger than individual landowners may be necessary.

Predicting and Monitoring Woody Biomass Harvesting on Biodiversity and Wildlife Habitats

- Key structural elements that could be harvested – or left to natural processes of decomposition and/or fire
- Impacts on understory tree, shrub and herbaceous layers (for different home ranges)
- Known wildlife trees – decaying live trees, trees with cavities, mast-producing trees

Will Certification Systems Work? Project v Whole Ecosystems

- State and national biomass harvesting guidelines
  - Canada – highest percentage of forests under management
  - Europe – moist forests, more intensive mgt than US
  - Eastern US states – more hardwoods, moister systems
- Sustainable forest management certification systems
  - PEFC umbrella – SFI, Canadian Standards, European systems - dominant
  - FSC – fewer members and less area
  - Purpose-grown trees – evolving from research plots and will be 'crops'
- Using long term and multi-site field research to guide development of best management practices and regulations
  - Canada is integrated as bioenergy is key goal
  - European forest research institutes and governments have high goals
  - US: USFS, University, and state research forests have less integration and funding

Key Information Gaps: Forest Resources, Biodiversity, and new LCFS product demand

- Field data on pre-commercial thinning (PCT) for environmental and social benefits
  - Forest industry rarely does PCT as it doesn't pay
  - Other landowners and neighbors may have other goals but social benefits > private benefits, so who should finance operations?
- Design and implement stand and landscape scale management trials to reduce carbon and other losses from disturbances (especially fire) and create LCFS feedstocks
  - Wildfires are not 'expected' at project level – so no permits
- Design habitat alteration experiments and analyze data to differentiate average from best management practices to sustain and restore wildlife habitats and biodiversity across multi-owner landscapes